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ATTY. DKT. NO.  
T702-03

## PATENT APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of:

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TITLE: PRIVACY-PROTECTED ADVERTISING SYSTEM

Enclosed are the following papers required for a filing date under 35 CFR §1.53(b):

- ☒ Specification 24 pages  
☒ Claims 7 pages  
☒ Abstract 1 pages  
☒ Drawings 8 sheets ☒ formal ☐ informal

The following additional papers are enclosed:

- ☐ Fee Transmittal  
☐ Declaration and Power of Attorney  
☐ Verified Statement(s) of Small Entity Status ☐ Independent Inventor ☐ Small Business  
☐ Non-Profit ☐ Other  
☐ Information Disclosure Statement ☐ Form PTO-1449  
☐ Assignment and Cover Sheet  
☐ Other:

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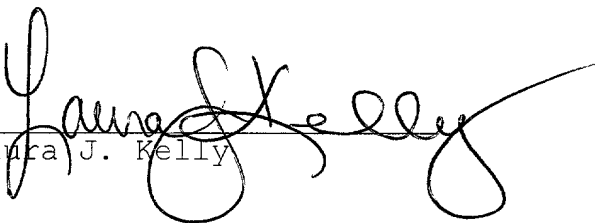
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*PRIVACY-PROTECTED ADVERTISING SYSTEM*

This application is a Continuation-In-Part (CIP) of co-pending U.S. Application number 09/204,888 filed on December 3, 1998. This application is also related to co-pending U.S. Application numbers 09/205,153 and 09/205,119 filed on December 3, 1998; 09/268,519, 09/268,526 and 09/268,520 all filed on March 12, 1999, and provisional application numbers 60/183,409 filed on February 18, 2000, 60/190,341 filed on March 16, 2000 and 60/196,375 filed on April 12, 2000. All of the above applications are herein incorporated by reference in their entirety, but are not admitted to be prior art.

**Background of the Invention**

Advertising forms an important part of broadcast programming including broadcast video (television), radio and printed media. The revenues generated from advertisers subsidize and in some cases pay entirely for programming received by subscribers. For example, over the air broadcast programming (non-cable television) is provided entirely free to subscribers and is essentially paid for by the advertisements placed in the shows that are watched. Even in cable television systems and satellite-based systems, the revenues from advertisements subsidize the cost of the programming, and were it not for advertisements, the monthly subscription rates for cable television would be many times higher than at present. Radio similarly offers free programming based on payments for advertising. The low cost of newspapers and magazines is based on the subsidization of the cost of reporting, printing and distribution from the advertising revenues.

Techniques for inserting pre-recorded spot messages into broadcast transmission have been known. Generally, broadcast video sources (i.e., TV networks, special interest channels, etc.) schedule their air time with two types of information:

- 5 "programming" for the purpose of informing or entertaining, and "avails" for the purpose of advertising. The avails may occupy roughly 20-25% of the total transmitting time, and are usually divided into smaller intervals of 15, 30, or 60 seconds.

10 In many prior art systems, the insertion of advertisements in avails is handled by a combination of cue-tone detectors, switching equipment and tape players that hold the advertising material. Upon receipt of the cue tones, an insertion controller automatically turns on a tape player containing the advertisement. Switching equipment then switches the system  
15 output from the video and audio signals received from the programming source to the output of the tape player. The tape player remains on for the duration of the advertising, after which the insertion controller causes the switching equipment to switch back to the video and audio channels of the programming  
20 source. When switched, these successive program and advertising segments usually feed to a radio-frequency (RF) modulator for delivery to the subscribers.

Many subscriber television systems, such as cable television are currently being converted to digital systems. These new  
25 digital systems compress the advertising data according to decompression standards, such as a Motion Picture Experts Group (MPEG) compression standard (currently MPEG-2 standard). The compressed data is then stored as a digital file on a large disk drive (or several drives). Upon receipt of the cue tone, the  
30 digital file is spooled ("played") off of the drive.

The advertisement may be inserted into the digital MPEG stream using digital video splicing techniques which include the healing of the broken MPEG stream. Alternatively, the digital advertisement may be converted to analog and spliced with an analog signal. Yet another technique for ad insertion involves decompressing the digital MPEG stream and splicing the ad in with the program in an uncompressed format.

A prior art (present model) of providing advertisements along with actual programming is based on linked sponsorship. In the linked sponsorship model, the advertisements are inserted into the actual programming based on the contents of the programming, e.g., a baby stroller advertisement may be inserted into a parenting program.

Even with linked sponsorship, advertising, and in particular broadcast television advertising, is mostly ineffective. That is, a large percentage, if not the majority of advertisements, do not have a high probability of effecting a sale. In addition to this fact, many advertisements are not even seen/heard by the subscriber who may mute the sound, change channels, or simply leave the room during a commercial break.

The reasons for such ineffectiveness are due to the fact that the displayed advertisements are not targeted to the subscribers' needs, likes or preferences. Generally, the same advertisements are displayed to all the subscribers irrespective of the needs and preferences of the subscribers.

In the Internet world, efforts have been made to collect information about subscriber likes and preferences by different means, e.g., by the use of cookies. In cookies and other profiling means, the user viewing habits, purchase habits, or surfing habits are monitored, recorded and analyzed, and then,

based on the analysis, suitable advertisements are selected.  
Even though cookies and other profiling means assist in targeting  
advertising, they have recently come under fire as these means  
are known to invade the privacy of the subscribers without their  
5 authorization.

Thus, a system and a method is desired for providing  
subscribers/consumers with advertisements which are more  
targeted/directed to their lifestyles, while ensuring that their  
demographic, purchase, and product preference data is maintained  
10 private.

### **Summary of the Invention**

The present invention is directed at a system and a method  
for providing subscribers/consumers with advertisements that are  
15 more directed to their lifestyles, while ensuring that their  
demographic, purchase, and product preference data is maintained  
private. The present invention allows manufacturers and  
advertisers to use their advertising dollars more effectively  
across a multitude of media platforms including video and  
20 Internet domains, and eventually extending into the printed  
media.

The system is based on the premise that the subscribers may  
agree to have advertisements delivered to them on a more  
selective basis than the prior art "linked sponsorship" model in  
25 which advertisements are only linked to the contents of the  
programming. Subscribers/consumers who sign up for this service  
will receive discounts from the Internet access or video service  
provider. Advertisers may send profiles for their advertisements  
to a Secure Correlation Server™ (SCS) which allows the  
30 advertisement to be correlated to the subscriber profiles. No

information regarding the subscriber is released, and subscribers who do not wish to participate in the service are not profiled.

A system in accordance with one embodiment of the present invention utilizes the principles of Quantum Advertising™ in which subscribers/consumers are described by consumer/subscriber characterization vectors that contain deterministic and probabilistic information regarding the consumer/subscriber, but do not contain privacy violating information such as, transaction records of purchases, video selections, or other raw data.

In accordance with the principles of one embodiment of the present invention, the subscriber profiles may be created by collecting information from a plurality of distributed databases. These distributed databases may be queried through the use of operators which in effect make measurements on certain "observables." By controlling the types of observables, certain parameters may be measured (in a probabilistic or deterministic sense) while other parameters may remain unmeasurable in order to preserve privacy. The operators may include clustering operators as well as operators for correlating advertisement characterization vectors with consumer/subscriber characterizations.

In another embodiment of the present invention, a system permits the targeting of advertisements in the Internet and video platforms, e.g., Switched Digital Video (SDV) and cable-based systems. In a SDV platform, the present invention allows for resolution of the advertising at the level of the home and even at the level of the individual user/subscriber. The system of the present invention may also be utilized for the delivery of advertisements over cable networks by selecting advertisements at the head end or substituting advertisements in the set-top box.

The general principles of the present invention are not constrained to video networks and may be generally applied to a variety of media systems including printed media, radio broadcasting, and store coupons. The system provides the overall capability to match advertisements using consumer profiles that do not contain the raw transaction information, thus subscriber privacy is maintained.

### **Brief Description**

10

### **of the Drawings**

These and other features and objects of the invention will be more fully understood from the following detailed description of the preferred embodiments which should be read in light of the accompanying drawings:

15 FIG. 1A illustrates advertisement applicability modeled as a distribution curve;

FIG. 1B illustrates an exemplary case of targeted marketing, where subscribers are divided into subgroups and the advertisement is displayed only to a subgroup of the subscribers;

20 FIG. 1C illustrates an exemplary case where different success rates are determined by measuring products or services that were purchased as the result of the viewing of a targeted advertisement;

25 FIG. 2 illustrates an exemplary television system based on traditional advertising schemes;

FIG. 3 illustrates a system utilizing targeted advertisements based on the principles of the present invention;

FIG. 4 illustrates an exemplary implementation of distributed databases, each of which contain a portion of



information that can be utilized to create a subscriber/consumer profile; and

FIGS. 5A and 5B illustrate examples of demographic factors including household size and ethnicity.

5

### **Detailed Description of the Preferred Embodiment**

In describing a preferred embodiment of the invention illustrated in the drawings, specific terminology will be used  
10 for the sake of clarity. However, the invention is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

15 With reference to the drawings, in general, and FIGS. 1A through 5B in particular, the apparatus of the present invention is disclosed.

The principles of the present invention propose a method and system for targeting advertisements to only a selected group of  
20 subscribers without jeopardizing the privacy of the subscribers. As illustrated in FIG. 1A, advertisement applicability, in accordance with the principles of the present invention may be modeled as a distribution curve. As illustrated in FIG. 1A, a well-designed advertisement may be found to be "applicable" by  
25 the majority of subscribers, but there will be a number of subscribers for whom the advertisement will not be applicable. Similarly, some of the subscribers may find the advertisement to be quite applicable or extremely applicable. The subscribers that find the advertisement to be extremely applicable are most  
30 likely to purchase the product or service, and the subscribers

that find the advertisement to be less applicable are less likely to purchase the product or service.

Thus, in accordance with the principles of the present invention, the overall subscribership may be divided into  
5 subgroups (smaller groups), and the advertisement may be displayed only to the subgroup that is most interested in the advertisement and is most likely to purchase the product. FIG. 1B illustrates an exemplary case where subscribers are divided into subgroups, and the advertisement is displayed only to a  
10 subgroup of the subscribers.

By forming subgroups and targeting advertisements to one or more subgroups, the effectiveness of the advertisements may be greatly increased, and overall advertisement success rates may be increased. The increase in overall advertisement success rates  
15 represents more effective use of advertising dollars, and is a "welfare gain" in the sense that those dollars may be used for other goods and services. FIG. 1C illustrates an exemplary case where different success rates are determined by measuring products or services that were purchased as the result of the  
20 viewing of an advertisement. As can be seen, the highest success rate corresponds to the subgroup that finds the advertisement to be extremely applicable, and the lowest success rate corresponds to the subgroup that finds the advertisement least applicable.

The principles of the present invention may be applied to  
25 many different applications. In one embodiment, the present invention is utilized in a cable-based television (CTV) system. FIG. 2 illustrates an exemplary CTV system based on a traditional advertising business model. The CTV system consists of a content provider 203 (e.g., programmers) producing syndicated programs  
30 having advertising spots (avails). The content provider 203 also incorporates national advertisements that are received from a

national advertiser 205. The programming contents (along with national advertisements) are then provided to a network operator (e.g., cable operator) 207. Generally, the network operator 207 purchases the programming contents for a fee. The network provider 207 is also provided with a right to substitute a percentage of the national advertisements with local advertisements (e.g. 20% of the advertisements may be substituted).

Thus, the network operator 207 may directly receive from one or more local advertisers 209 local advertisements to replace a percentage of the national advertisements. The local advertisements may also be received from the national advertiser 205. The network operator 207 then delivers the advertisements and programming to subscribers/consumer 215 via an access network 211. The information may be delivered to a personal computer or a television or any other display means at the subscriber end. The access network 211 may be a cable-based system, a satellite-based television system, an Internet-based computer network, or a Switched Digital Video (SDV) platform using xDSL transmission technology. Such access systems are well known to those skilled in the art.

In traditional systems, e.g., in the exemplary system of FIG. 2, the local advertisements are not generally customized based on the needs/preferences of the subscribers. Instead, the local advertisements are selected based on local markets, and the same advertisement is displayed to a subgroup, e.g., the opening of a local store may be advertised to a few local subscribers. Thus, even though the traditional advertising scheme as illustrated in FIG. 2 attempts to substitute national/generic advertisements with some local advertisements, the effectiveness

of the advertisements is not increased because the advertisements are not customized/tailored based on user preferences/likes.

FIG. 3 illustrates a system utilizing targeted advertisements based on the principles of the present invention.

5 In this model, the local advertisements are delivered from the advertisers to a centralized Secure Correlation Server™ 305 configured to perform matching of the advertisements to subscribers or groups of subscribers. At the correlation server 305, the input is received from a secure profiling system 307 in  
10 the form of subscriber profiles, and advertisements are matched to one or more subscriber profiles.

As illustrated in FIG. 3, a content provider 303 receives national advertisements from one or more advertisers 301, multiplexes the national advertisements in the programming and  
15 forwards the program streams having national advertisements to the correlation server 305. The correlation server 305 evaluates the advertisements and attempts to match them with one or more subscriber profiles stored in the secure profiling system 307. The correlation server 305, based on one or more subscriber  
20 profiles can substitute national advertisements within the program streams with more targeted advertisements received from local advertisers 309 or from national advertisers 311. The correlation server 305 may also receive local advertisements from the advertisers 301.

25 The correlation server 305 forwards programming having targeted advertisements to a network operator 313. The programming having targeted advertisements may then be forwarded to a subscriber 317 via an access network 315. On the subscriber end, the information may be delivered to a personal computer or a  
30 television or any other display means.

FIG. 3 illustrates the ability of a system in accordance with the principles of the present invention to target national advertisements as well as local advertisements. The advertisers may provide national advertisements to a Secure Correlation Server™ 305 that may match the advertisements to different subscribers 317. By providing the ability to match advertisements to demographic groups (in cable television systems) and to individual subscribers (in switched digital video systems) using the correlation process, the present invention allows for substantial increases in advertising effectiveness.

The system of FIG. 3 is secure for many reasons. First, the correlation server 305 does not contain raw data such as viewing or purchase records. Second, the correlation server 305 does not transmit subscriber/consumer profiles to third parties, and only performs internal calculations to determine the applicability of an advertisement to an individual subscriber.

It is to be noted that even though previously described embodiments are described with reference to video advertisements, the principles of the present invention are not based on a particular media. The principles of the present invention may be applied to diverse media such as printed media in which there are national (broadcast) advertisements as well as local advertisements, Internet advertisements, radio advertisements (in particular Internet radio broadcasting) and a variety of other forms of media advertisements.

In accordance with the principles of the present invention, different types of profiles may be created by the secure profiling system 307. These profiles may be subscriber profiles created from video selection data, consumer profiles created from retail purchases, and profiles created from the voluntary information provided by the consumer/subscriber. In a switched

digital video system, these profiles may be based on individual viewing habits. In cable-based television systems, these profiles may be based on specific pay-per-view demands. In Internet-based computer networks, these profiles may be based upon Internet surfing habits.

The principles of the present invention also provide novel ways of collecting subscriber information, e.g., subscribers have options to control the flow of information. In one implementation, the subscribers decide whether they want to be enrolled in the profiling, i.e., whether they want their viewing habits and other information to be collected.

In this implementation, the data is collected with the explicit permission of the consumer/subscriber, who enrolls in the service and agrees to be profiled, similar to an "opt-in" feature. In the "opt-in" feature, the subscriber/consumer is specifically inquired whether he or she wants to be profiled. In exchange for opt-in, the subscribers may receive economic benefit from the service through discounts on cable service, discounts through retail outlets, rebates from specific manufacturers, and other incentive plans.

In the case of video services, the subscribers may be presented with a series of enrollment screens that confirm the subscribers' opt-in and ask the subscriber for specific demographic information that may be used to create one or more subscriber profiles.

In performing the enrollment process, it is possible to obtain specific demographic information including household income, size, and age distribution. Although this information is not necessary for profiling, obtaining it from the subscriber

allows deterministic information to be used in conjunction with the probabilistic information.

Other opt-in methods may be used for the different media. In an Internet environment, a free browser add-on/plugin may be used that performs profiling through one or more secured techniques that remove cookies, alters/hides surf streams. In this case, the subscriber will have an option to enroll in a secure system that permits profiling in a controlled and secure manner along with providing economic incentives for participation in the profiling process. Upon enrolling in the service, a profiling module may be downloaded or activated that may perform the profiling through the browser.

The principles of the present invention also support the construction of distributed databases, each of which contain a portion of information that is utilized to create a subscriber/consumer profile. The distributed databases are constructed such that no privacy violating information is contained in one database, and the operators utilized to extract information from each database preserve privacy and do not measure the parameters which should not be observed.

In the actual formation of subscriber profiles, the system may extract information from a plurality of databases and aggregate portions of the information to create a subscriber profile. In the aggregation of data, the emerging standards, such as XML, may be used for the transport of the data and the standardized profiles may be utilized to ensure that the secured server may effectively combine the elements of the distributed profiling databases to create a composite consumer/subscriber characterization vector characterizing subscriber profiles.

As illustrated in FIG. 4, the distributed database may be comprised of specific data sets including: purchase transaction data 401 obtained from a point-of-sale 411 which may be a physical point-of-sale or a virtual (Internet) point-of-sale; Internet transaction data 407 obtained from a PC 417 or other device connected to the Internet; video transaction data 405 obtained in conjunction with a television/set-top combination 425 or other video centric device; and demographic data 403 obtained from demographic data sources 413. The examples of demographic data sources include commercial databases such as the MicroVision™ product from the Claritas corporation™. Other public or private databases 409 including those containing tax information may also be used. Different distributed databases are configured to a secure correlation server (SCS) 415.

In the present invention, Quantum Advertising™ is proposed wherein a probabilistic representation of an individual's interests, in particular, products and services, is utilized and specific private information about the individual is kept private. In this way, it is possible for advertisers to effectively target information to consumers without violating their privacy. The basis for what is termed Quantum Advertising™ is derived from quantum mechanics, and in particular rests on the concept that an individual's information may be treated in a similar fashion to electrons and other subatomic particles. In quantum mechanics, it is possible to have a probabilistic representation of a particle, but impossible to have a deterministic representation in which the precise position of the particle is known.

In the present invention, the probabilistic descriptions of subscribers along with a restricted set of operators are developed. The restricted set of operators allows certain



measurements to be made, but prohibits privacy invading determinations. As an example, an operator may be created and utilized that may indicate a probability that an individual will potentially purchase a new health care product, such as a shampoo or a toothpaste, but proper construction of the database and operators would prohibit determination of the individual's exact income in order to see if they are a potential purchaser of that product.

Another example would be the development of a target group for a new drug, such as an HIV related product. The proper construction of the databases and operators may allow for the formation of a group of individuals likely to be receptive to the product, but would not allow identification of individuals in the group, and the database would not contain health related information such as HIV status.

Thus, the principles of the present invention utilize one or more operators that allow the measurement of certain parameters (non-deterministic parameters), but prohibit the measurement of other parameters. In accordance with the principles of the present invention, the description of an individual/household may be contained in a vector which is described as the ket vector, using the notation  $|A\rangle$  where A represents the vector describing an aspect of the individual/household.

The ket vector  $|A\rangle$  can be described as the sum of components such that

$$\begin{aligned} |A\rangle = & (a_1\rho_1 + a_2\rho_2 + \dots a_n\rho_n) \\ & + (b_1\sigma_1 + b_2\sigma_2 + \dots b_n\sigma_n) \\ & + (c_1\tau_1 + c_2\tau_2 + \dots c_n\tau_n) \\ & + (d_1\nu_1 + d_2\nu_2 + \dots d_n\nu_n) \end{aligned}$$

$$+ (e_1\omega_1 + e_2\omega_2 + \dots e_n\omega_n)$$

where  $a_n\rho_n$  represents weighted demographic factors which may be deterministic or probabilistic.

The other components of the ket vector  $|A\rangle$  include:

- 5  $b_n\sigma_n$ , which represents weighted socio-economic factors;
- $c_n\tau_n$ , which represents weighted housing factors;
- $d_n\nu_n$ , which represents weighted purchase factors; and
- $e_n\omega_n$ , which represents weighted consumption factors.

10 The elements of the ket vector  $|A\rangle$  may be stored on distributed databases, and the components within the groups above can be mixed and stored in various locations. In addition,  $|A\rangle$  may not comprise all of the components listed above, but may instead utilize only a subset of that information.

15 Consistent with the concepts of wave functions in quantum mechanics, for each ket vector there is a corresponding bra vector of the format  $\langle A|$ . In order to insure that the probabilities are normalized, the identity  $\langle A|A\rangle = 1$  is insured. Although the ket and bra vectors are expected to be real entities, there is the possibility of storing additional  
 20 information in a complex ket vector, in which case the corresponding bra vector will be  $\langle A^*|$ , and the normalization criteria is  $\langle A^*|A\rangle = 1$ .

25 Having created the basic descriptions of the households/individuals in the form of a distributed or centralized database, a series of linear operations may be performed on the database in order to obtain results which provide targeting information. The linear operations may be

performed using one or more operators, which when applied to the database, yield a measurable result. It is important to note that by proper construction of the operators, it is possible to prevent inappropriate (privacy violating) measurements from being  
5 made.

The generalized method for obtaining information from the database is thus:

$$\text{targeting information} = \langle A | f | A \rangle$$

where  $f$  is a single operation or series of operations which  
10 result in a measurable quantity (observable). Through the application of these operators it is possible to query the database in a controlled manner and obtain information about a target group, or to determine if an advertisement is applicable to an individual/household (subscriber).

15 For determination of the applicability of an advertisement to an individual/household, the advertiser can supply an ad characterization vector along with the ID of an individual/household, with the applicability of the advertisement being determined as:

20 
$$\text{ad applicability} = \langle A | AC\{ID\} | A \rangle$$

where  $AC\{ID\}$  is the ad characterization vector which contains an ID which may be at the individual, anonymous, or group level. Examples of the possible IDs are as follows:

Individual Level:

25           social security #  
            address  
            credit card/courtesy card #  
            phone #

Anonymous (e.g. through the use of anonymous transaction profiling):

transaction ID (video transaction records)

transaction ID (purchase transaction records)

5 transaction ID (surfing transaction records)

Group:

zip code

area code/central office code

domain name

10 employer

The use of individual/household IDs allows determination of the applicability of an advertisement for a particular household or individual. Anonymous transaction IDs may be used when no information regarding the identity of the subscriber is being  
15 provided, but when transaction profiles have been developed based on the use of anonymous transaction profiling. Group IDs may be utilized to determine applicability of an advertisement to a particular group, with the basis for the grouping being geographic, demographic, socio-economic, or through another  
20 grouping mechanism.

The operators may result in a simple correlation operation in which the operator contains an advertisement characterization vector which is correlated against elements in the database, or may be a series of operations which result in the determination  
25 of the applicability of an advertisement, or determination of the product preferences of a group or an individual.

The ad characterization vector contains a description of the expected characteristics of the target market. The ad

characterization vector may be obtained from the advertiser, a media buyer, or individual cognizant of the market to which the advertisement is directed.

Other operators can be constructed so that functions other than correlations can be performed. As an example, grouping or clustering can be performed on the database by performing a series of operations which identifies consumers with similar characteristics. In addition to grouping or clustering, operators can be constructed to identify a set of subscribers who are candidates for a product based on specific selection criteria. As an example, it is possible to construct an operator which returns a list of subscribers likely to be interested in a product, with the level of interest being determined from probabilistic elements such as age, income, previous purchase profiles, Internet profiles, or video selection profiles.

Proper construction of the database (and in particular construction of the ket vectors and ket vector subcomponents) and the operators ensures that privacy is maintained and prevents direct reading of the data and inappropriate queries. Furthermore, the actual transaction records (e.g. purchases, web surf streams, or channels viewed) are never stored, and no privacy violating information (e.g. medical conditions) are stored in the database.

FIGS. 5A and 5B illustrate examples of demographic factors including household size and ethnicity. As previously mentioned, these functions may not necessarily be probabilistic, but may be obtained from questionnaires presented to the subscriber which lead to deterministic responses. These responses can be represented as unity value probabilities.

The principles of the present invention propose advantages both for subscribers and advertisers. A proposed service in accordance with the principles of the present invention will be free to the subscriber and includes incentives such as discounts  
5 on Internet/video service. Furthermore, the advertisers may pay a premium for advertisements placed using the system. This premium is amongst the content provider, the Internet/video service provider, and the provider of ad matching.

As an example, if an advertising opportunity during a  
10 network sports event costs \$0.10 per viewer, the charge for the matched advertisement (ad) might be \$0.14 per viewer. The additional \$0.04 is divided amongst the content provider (in this case the network), the Internet/video service provider, and the provider of ad matching. Because the ad is not displayed to the  
15 entire set of viewers, but rather to the subset of viewers which will find the ad acceptable, the total cost to the advertiser is likely to be less than, or at most the same as without the matching. The ad matching increases the effectiveness of the advertising and thus makes better use of advertising dollars.

20 The service may be applied to cable networks, both for Internet based services as well as video services. For Internet based services over cable networks, the targeting may be at the level of the individual home. For video services, the targeting is presently at the level of the node, since cable networks do  
25 not have the individual home resolution that switched digital video networks have. Ad substitution technology at the set-top level may increase the resolution of cable advertising, while SDV networks are inherently capable of resolution at the individual home level.

30 In one embodiment, the present invention may be deployed as an Ad Management System (AMS) in a video environment. The AMS

includes a Secure Correlation Server™ (SCS) configured to deliver targeted advertisements over video systems including Switched Digital Video (SDV) platforms, cable platforms, satellite platforms, and streaming video (Internet) delivery platforms. The system allows for advertisers to deliver ad characterization vectors to the Secure Correlation Server™ (SCS). The ad characterization vectors assist in determining the applicability of the advertisements to a particular subscriber or group of subscribers (e.g., node). The AMS performs the functions of prioritizing, selling, scheduling, and billing of video advertisements.

In another embodiment, the present invention may be deployed as a browser add-on/plugin for the Internet environment. In this embodiment, the profiling is not completely blocked, but the subscriber is allowed to switch to a secured mode wherein the subscriber is profiled via a secure system. In return, subscribers receive economic benefit for their participation.

In another embodiment, the present invention is a profiling product that operates at the point-of-purchase (retail outlet, mail order, or other retail purchasing system) and produces profiles based on the purchases of the subscriber. The specific purchases of the consumer are not stored, and the profiles are only utilized by authorized members.

In another embodiment, the principles of the present invention are deployed as a secured credit card that may be utilized to monitor purchase transactions of the subscribers and to ensure consumers that their purchase information will not be aggregated, but to allow them to gain the benefits of secure profiling. By the use of a secured credit card, consumers may allow profiling based on their purchase records. This embodiment

ensures that the raw transaction data (detailed purchase records) is not stored.

By using a credit card which is part of the targeted advertising business, it is possible to track the purchases made by that consumer. Although it is preferable to discard the specific transaction data after profiling, use of a credit card associated with the targeted advertising process allows for tracking of purchase activity by consumers who "opt-in". The credit card may also be subsidized by the advertising dollars, thus creating a low interest rate credit card, which would be an incentive to "opt-in".

In this embodiment, advertisers may also be able to correlate their advertisements against consumer information and target advertisements to the subscribers, however, the advertisers are not provided access to the profiles themselves. The revenues generated by the credit card issuer/profiler may be used to subsidize the credit card in the form of decreased interest rates and/or discounts or rebates for use of the card. Another feature of the secured credit card is the ability to determine if a displayed advertisement resulted in the purchase of an item. As an example, if a targeted advertisement is displayed to a consumer via the present system and the item is subsequently purchased using the secured credit card, the advertisement may be marked as effective. On a statistical basis, the effectiveness of an advertising campaign may be readily measured when the subscribers receive advertisements through the secured system and make their purchase using the secured credit card of the present invention.

In one implementation, the present invention may be based on the use of a secure correlation server (SCS) connected directly to an access platform, e.g., a Broadband Digital Terminal (BDT).



In this implementation, the secure correlation server is capable of receiving video profiles (formed from channel changes and dwell times) from the BDT as well as receiving consumer purchase records from participating retail outlets and/or online stores.

5 The SCS may also utilize the data from external databases.

In this implementation, the profiling is performed based on consent, e.g., the profiles of subscribers/consumers who opt-in for the service agree to have their demographic and preference profiles stored on the SCS.

10 Advertisers wishing to send advertisements to a subscriber during an ad opportunity (Web page ad location or video advertising spot) transmit an ad characterization vector to the SCS. The ad characterization vector may be created by the advertiser by simply filling out a Web page containing questions  
15 (with pull down answers) which describe the target market by demographic information or by preference information.

Upon receiving the ad characterization vector the SCS correlates the ad characterization vector with the subscriber/consumer characterization vector. Based on the  
20 results of this correlation, the SCS may determine whether the ad should be delivered to the subscriber, or if an alternate ad should be presented.

A privacy firewall may be maintained between the BDT and the SCS to ensure that subscriber/consumer characterization vectors  
25 may not be read or constructed by unauthorized parties. Because no raw data (consumer purchase or viewing records) are stored on the SCS, there is no possibility of unauthorized access of private information. This system allows subscribers/consumers the ability to receive more desirable advertisements while  
30 simultaneously receiving discounts for Internet/video services

and at retail/online outlets. Advertisers receive the benefit of more effective advertisements, and thus spend advertising dollars more efficiently. This increase in efficiency results in increased revenue stream. Advertisers pay a premium for targeted  
5 advertisements, as opposed to traditional linked sponsorship advertisements in which a flat rate is paid for access to an audience whose characteristics are only generally known.

Although this invention has been illustrated by reference to specific embodiments, it will be apparent to those skilled in the  
10 art that various changes and modifications may be made, which clearly fall within the scope of the invention. The invention is intended to be protected broadly within the spirit and scope of the appended claims.

## Claims

What is claimed is:

1. A method for presenting targeted advertisements to a subscriber, the method comprising:

5 extracting probabilistic information about subscriber activities from one or more sources; and

processing the probabilistic information about subscriber activities to generate a subscriber characterization vector.

10 2. The method of claim 1, wherein the probabilistic information contains deterministic information about the subscriber.

15 3. The method of claim 2, wherein the probabilistic information contains non-deterministic information about the subscriber.

20 4. The method of claim 3, wherein said processing includes combining the deterministic information and the non-deterministic information to create the subscriber characterization vector.

5. The method of claim 1, wherein the probabilistic information is collected from one or more distributed databases.

6. The method of claim 1, wherein the probabilistic information is collected in the form of a ket vector represented by:

$$\begin{aligned} |A\rangle = & (a_1\rho_1 + a_2\rho_2 + \dots a_n\rho_n) \\ & + (b_1\sigma_1 + b_2\sigma_2 + \dots b_n\sigma_n) \\ & + (c_1\tau_1 + c_2\tau_2 + \dots c_n\tau_n) \\ & + (d_1\nu_1 + d_2\nu_2 + \dots d_n\nu_n) \\ & + (e_1\omega_1 + e_2\omega_2 + \dots e_n\omega_n) \end{aligned}$$

wherein  $a_n\rho_n$  represent weighted demographic factors,  $b_n\sigma_n$ ,  
represents weighted socio-economic factors,  $c_n\tau_n$  represents  
weighted housing factors,  $d_n\nu_n$  represents weighted purchase  
factors; and  $e_n\omega_n$  represents weighted consumption factors.

7. The method of claim 6, wherein the different elements  
of the ket vector are stored in one or more distributed  
databases.

8. The method of claim 6, wherein the ket vector is  
normalized by a corresponding bra vector.

9. The method of claim 6, wherein the weighted demographic  
factor includes deterministic information.

10. The method of claim 6, wherein the weighted demographic factor includes probabilistic information.

11. The method of claim 1, further comprising utilizing the subscriber characterization vector to find a target advertisement for the subscriber.

12. The method of claim 1, further comprising forwarding the subscriber characterization vector to a secure correlation server.

13. The method of claim 12, further comprising matching the advertisements to the subscribers based on the subscriber characterization vector.

14. The method of claim 13, wherein said matching is performed by the secure correlation server.

15. The method of claim 1, wherein the subscriber activities include television viewing data.

16. The method of claim 1, wherein the subscriber activities include Internet surfing data.

17. The method of claim 1, wherein the subscriber activities include purchase transaction data.

18. A method for targeting advertisements in a privacy protected manner to one or more subscribers, the method comprising:

retrieving subscriber related information in the form of a ket vector represented by:

$$\begin{aligned} |A\rangle = & (a_1\rho_1 + a_2\rho_2 + \dots a_n\rho_n) \\ & + (b_1\sigma_1 + b_2\sigma_2 + \dots b_n\sigma_n) \\ & + (c_1\tau_1 + c_2\tau_2 + \dots c_n\tau_n) \\ & + (d_1\nu_1 + d_2\nu_2 + \dots d_n\nu_n) \\ & + (e_1\omega_1 + e_2\omega_2 + \dots e_n\omega_n) \end{aligned}$$

wherein  $a_n\rho_n$  represents weighted demographic factors,  $b_n\sigma_n$ , represents weighted socio-economic factors,  $c_n\tau_n$  represents weighted housing factors,  $d_n\nu_n$  represents weighted purchase factors; and  $e_n\omega_n$  represents weighted consumption factors; and

applying an operator to the ket vector to obtain an observable targeted marketing result.

19. The method of claim 18, further comprising presenting targeted advertisements to the subscriber by utilizing the observable result.

20. The method of claim 18, wherein said applying an operator performs a correlation operation with an advertisement characterization vector.

5

21. The method of claim 18, wherein said applying an operator performs a grouping operation.

22. The method of claim 18, wherein said applying an operator performs a targeted consumer identification function.

23. A computer system for targeting advertisements to one or more subscribers in a privacy protected manner, the system comprising:

a plurality of distributed databases storing information about subscribers; and

a secure correlation server coupled to the distributed databases, wherein the secure correlation server retrieves the information from the distributed databases in the form of one or more ket vectors.

24. The system of claim 23, wherein the ket vector is represented by:

$$|A\rangle = (a_1\rho_1 + a_2\rho_2 + \dots a_n\rho_n)$$

$$\begin{aligned}
& + (b_1\sigma_1 + b_2\sigma_2 + \dots b_n\sigma_n) \\
& + (c_1\tau_1 + c_2\tau_2 + \dots c_n\tau_n) \\
& + (d_1\nu_1 + d_2\nu_2 + \dots d_n\nu_n) \\
& + (e_1\omega_1 + e_2\omega_2 + \dots e_n\omega_n)
\end{aligned}$$

5        wherein  $a_n\rho_n$  represents weighted demographic factors,  $b_n\sigma_n$ ,  
represents weighted socio-economic factors,  $c_n\tau_n$  represents  
weighted housing factors,  $d_n\nu_n$  represents weighted purchase  
factors; and  $e_n\omega_n$  represents weighted consumption factors.

10        25. The system of claim 23, wherein said secure correlation  
server applies an operator to the ket vector to obtain an  
observable result.

15        26. The system of claim 25, wherein said secure correlation  
server utilizes the observable result to present targeted  
advertisements to the subscribers.

20        27. The system of claim 25, wherein the operator performs a  
correlation operation.

28. The system of claim 25, wherein the operator performs a  
grouping operation.



29. The system of claim 25, wherein the operator performs a targeted consumer identification operation.

### Abstract of the Disclosure

A system and a method for providing subscribers/consumers with advertisements that are more directed to their lifestyles, while insuring that their demographic, purchase, and product preference data is maintained private. Manufacturers and advertisers may use their advertising dollars more effectively across a multitude of media platforms including video and Internet domains, and eventually extending into the printed media. Advertisers may send profiles for their advertisements to a secure correlation server (SCS) which allows the advertisement to be correlated to the subscriber profiles. No information regarding the subscriber is released, and subscribers who do not wish to participate in the service are not profiled. The subscribers/consumers are described by consumer/subscriber characterization vectors that contain deterministic and probabilistic information regarding the consumer/subscriber, but do not contain privacy violating information such as the transaction records of purchases, video selections, or other raw data. The subscriber profiles may be created by collecting information from a plurality of distributed databases. These distributed databases may be queried through the use of operators which in effect make measurements on certain "observables." By controlling the types of observables, certain parameters may be measured (in a probabilistic or deterministic sense) while other parameters may remain unmeasurable in order to preserve privacy. The operators may include clustering operators as well as operators for correlating advertisement characterization vectors with consumer/subscriber characterizations.

30

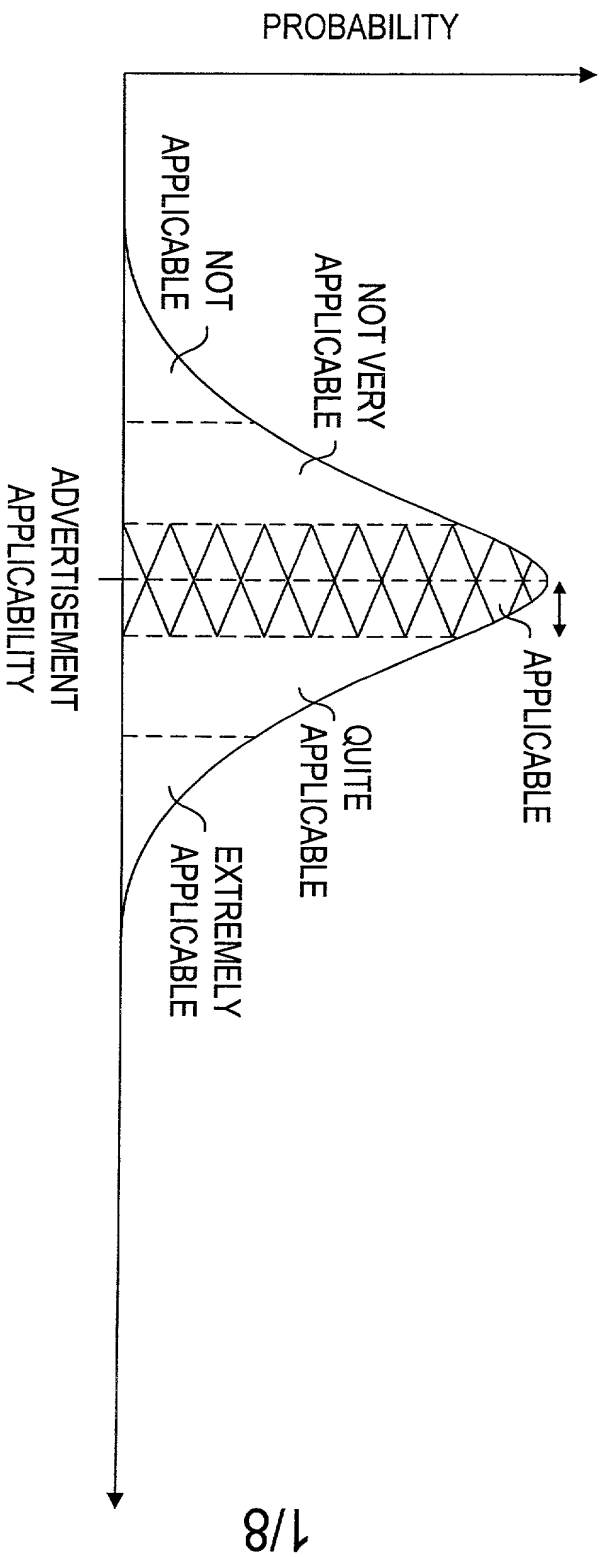
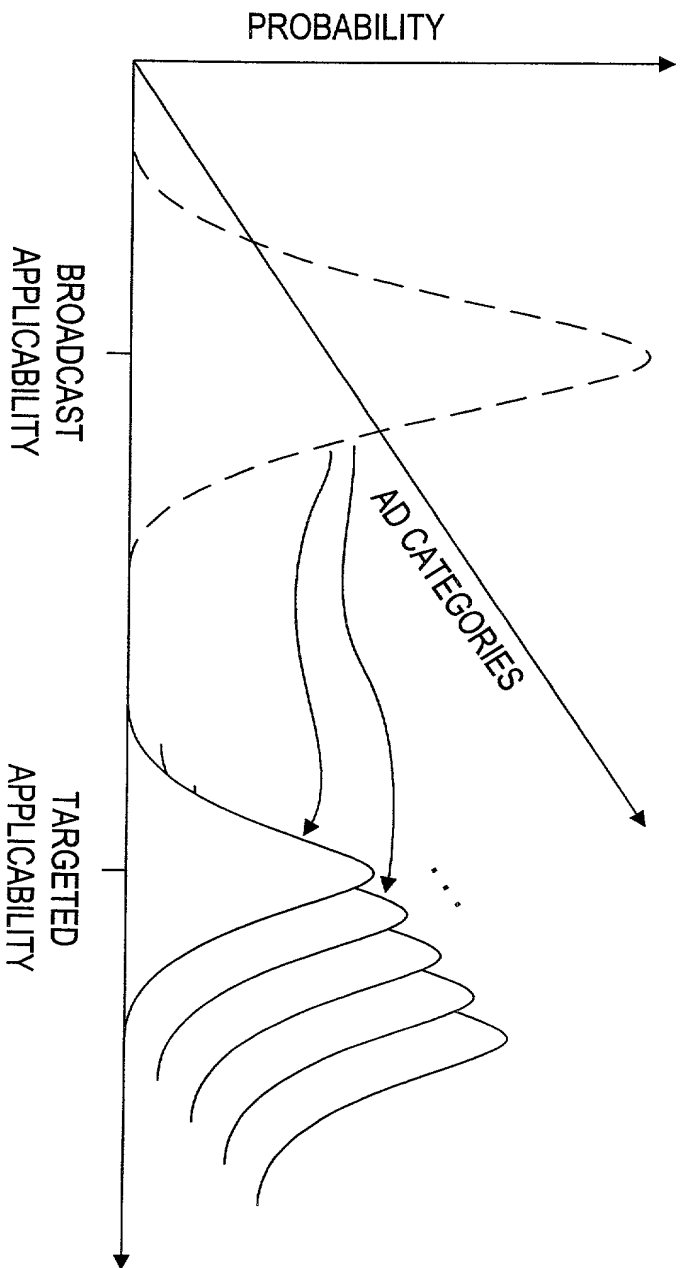


FIG. 1A

FIG. 1B



ADVERTISEMENT SUCCESS RATES	
ADVERTISEMENT APPLICABILITY	SUCCESS RATE
EXTREMELY APPLICABLE	0.05
QUITE APPLICABLE	0.03
APPLICABLE	0.01
NOT VERY APPLICABLE	0.005
NOT APPLICABLE	0.001

FIG. 1C

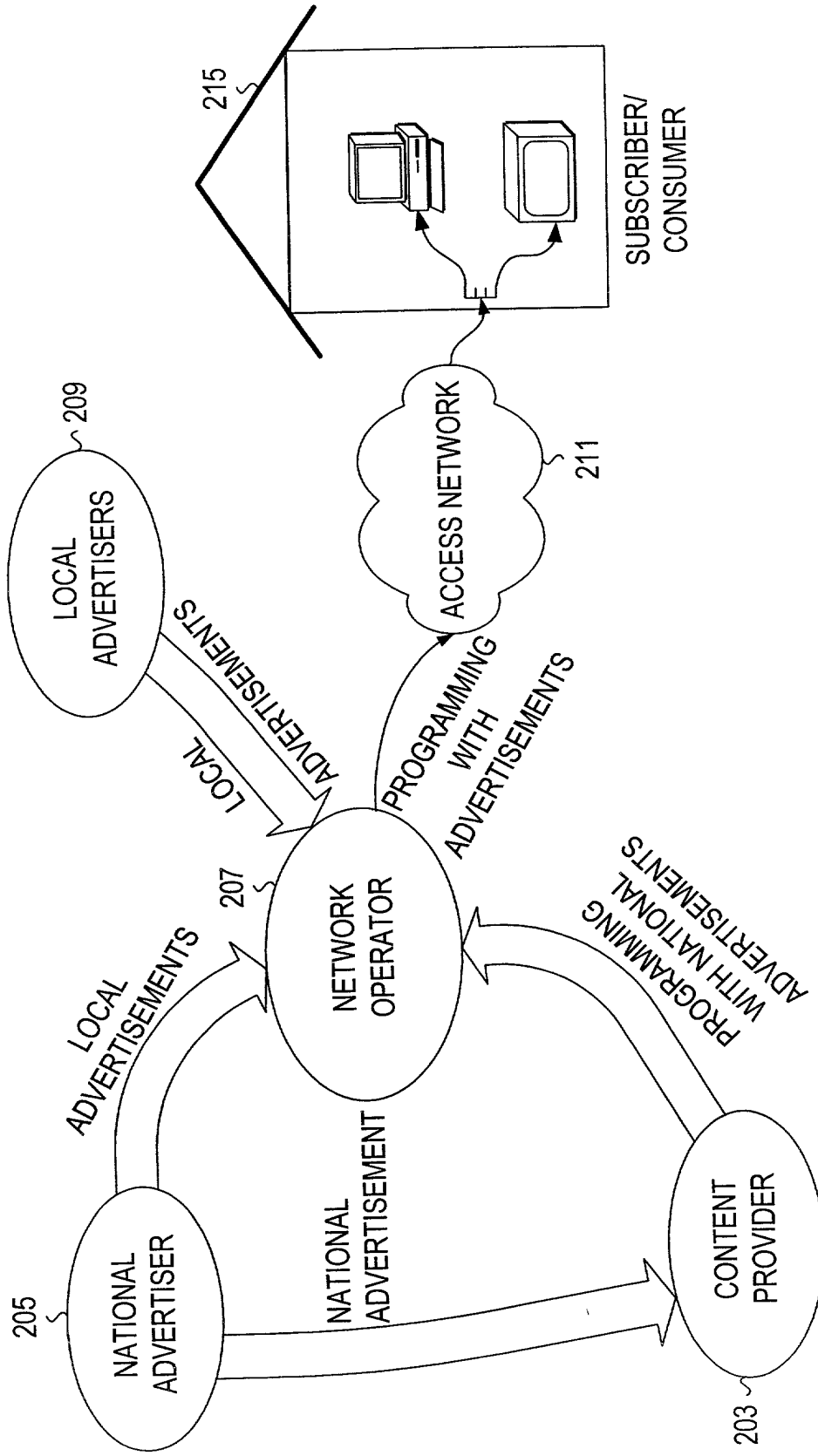
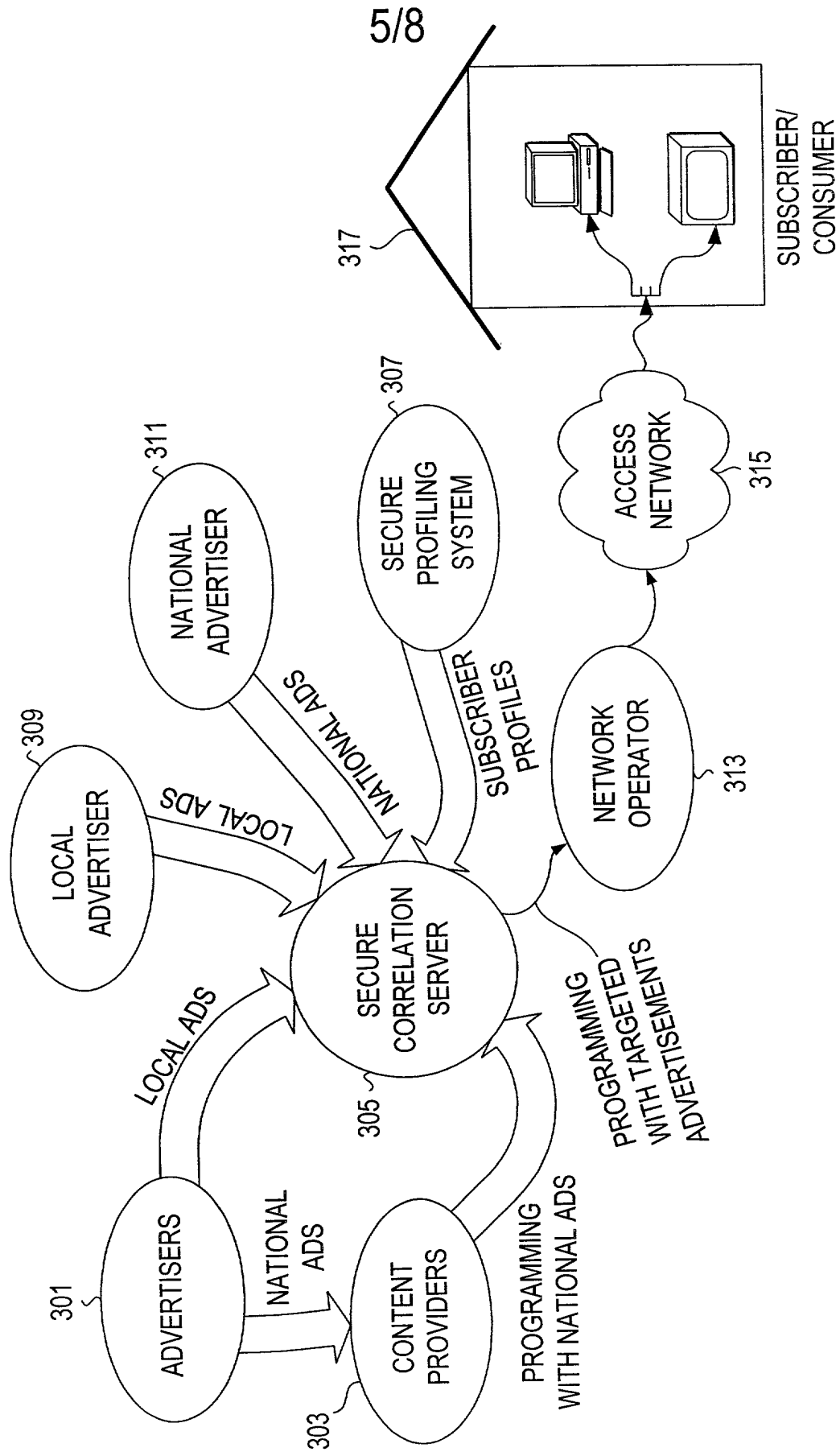
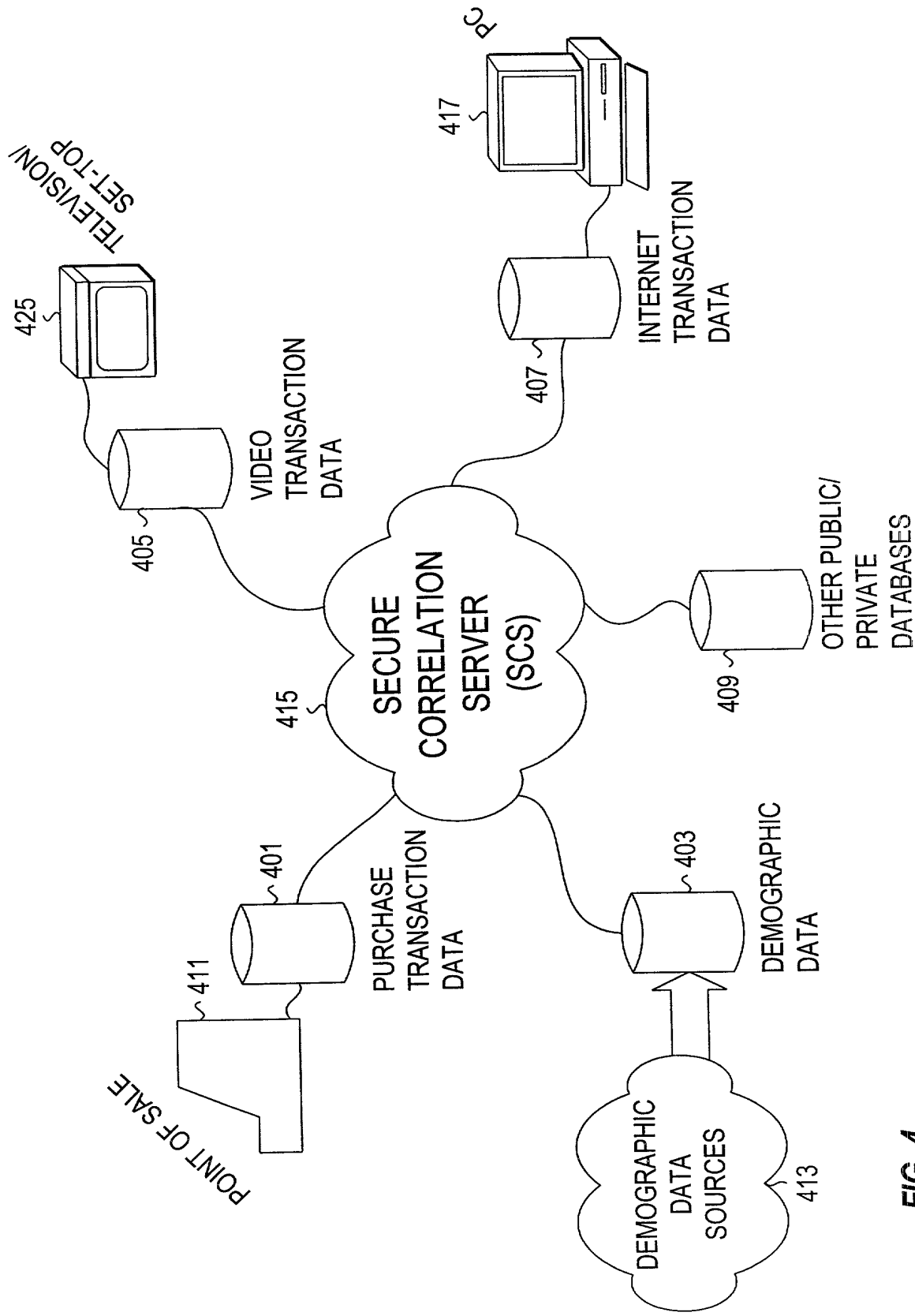


FIG. 2





**FIG. 4**



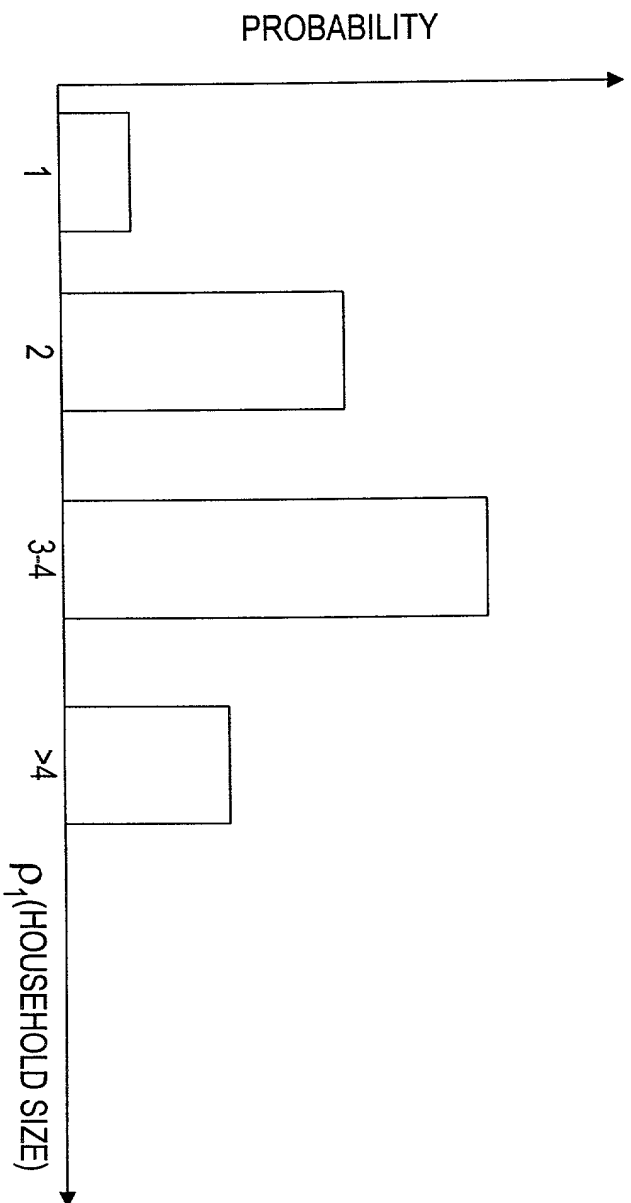
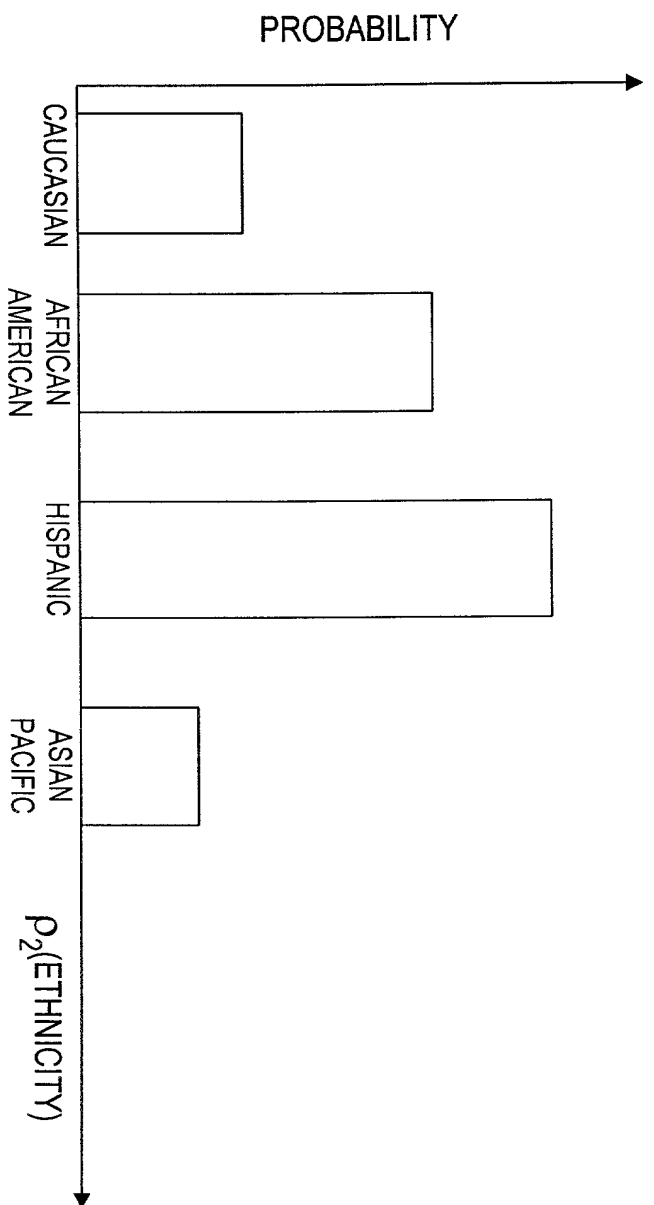


FIG. 5A



**FIG.5B**